

93. Ligamentous Injuries of the Ankle

Ligamentous injuries of the ankle are quite common and well-visualized on MRI. Ligamentous structures appear as uniform low SI on all conventional pulse sequences, although magic angle effects can produce a focus of high SI on short TE sequences. Familiarity with the normal ligamentous anatomy of the ankle is crucial. The ankle can be divided into medial and lateral ligamentous compartments. The lateral collateral ligamentous complex is most commonly injured and consists of the anterior talofibular, posterior talofibular, and calcaneofibular ligaments. The normal appearance of the anterior talofibular ligament is illustrated in Fig. 93.1A, an axial FS T2WI illustrating this low SI ligament spanning from the anterior portion of the fibular lateral malleolus to the talar neck. The posterior talofibular ligament is also best visualized on axial or coronal images and spans from the fibular malleolar fossa to the posterior talar tubercle. The anterior talofibular ligament, due to its relative lack of strength compared with other lateral compartment ligaments, is the first and oftentimes only ligament torn in inversion injuries of the plantar-flexed foot. Ligamentous stretching constitutes a Grade 1 lateral ankle sprain, while a partial tear represents a Grade 2 lesion. Grade 3 lateral ankle sprains consist of complete tearing of anterior talofibular and calcaneofibular ligaments. The axial FS T2WI of Fig. 93.1B demonstrates thickening, intermediate SI, and discontinuity of the fibers of the anterior talofibular ligament, findings consistent with a partial tear (white arrow). A complete tear of the anterior talofibular ligament is seen in Fig. 93.1C in which the ligament is simply absent. Other appearances of complete tears include a fluid-filled gap or focal ligamentous discontinuity with fraying of its ends. Soft tissue edema and joint effusions are reliable findings that indicate lesion acuity, resolving in the setting of chronic tears. A thick, irregular ligament also signifies chronicity. MR arthrography may also be used to assess lateral ankle injuries. In complete anterior talofibular tears, contrast will

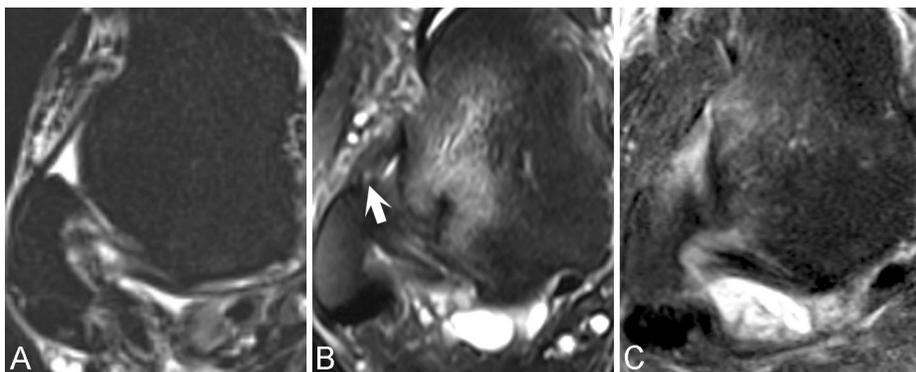


Fig. 93.1

extend to surround the talar neck. If a calcaneofibular tear is present, contrast will enter the peroneal tendon sheath.

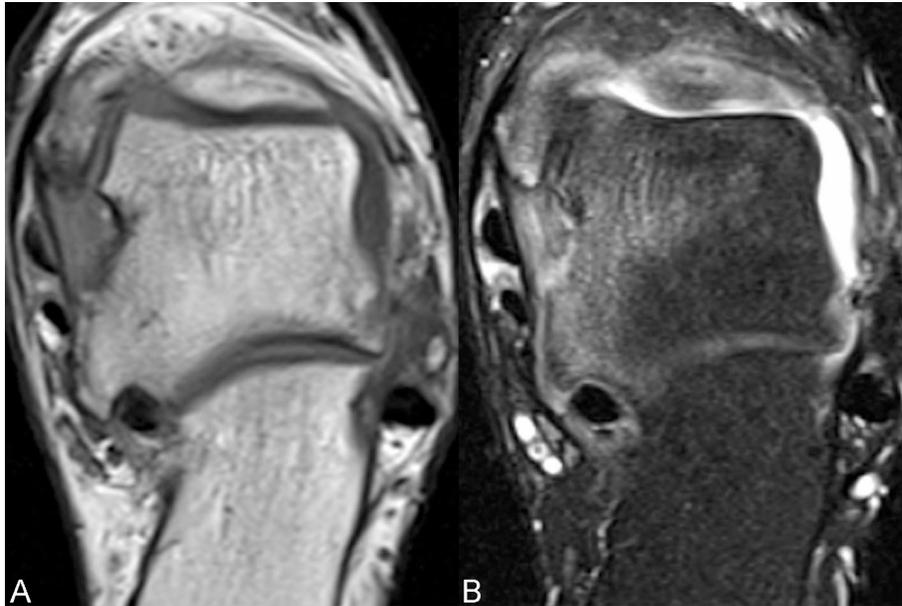


Fig. 93.2

The deltoid or the medial collateral ligament is commonly sprained but infrequently torn. This ligament consists of four superficial and two deep components. The superficial components all originate at the medial malleolus, extending to the navicular (tibionavicular), sustentaculum tali (tibiocalcaneal), medial talar tubercle (superficial tibiotalar), and spring ligament (tibiospring). The spring or plantar calcaneonavicular ligament is a deep ligament stabilizing the arch and spanning from the sustentaculum tali to the medial navicular. The deep ligaments arise at the anterior colliculus of the medial malleolus and attach to the anterior and posterior portions of the talus (anterior and posterior deep tibiotalar ligaments). Figure 93.2A,B demonstrates a tear of the deltoid ligament, specifically of its posterior tibiotalar component. On (A) paraxial T1WI, the ligament is thickened, has lost its striated appearance, and demonstrates moderate SI. There is also the suggestion of scattered hypointensity within the medial talus and medial malleolus, consistent with bone contusion. Avulsion fracture of the latter may occur with some deltoid tears. (B) A paraxial FS T2WI demonstrates interstitial hyperintensity within the ligament and also hyperintensity within the talus and medial malleolus, again correlating with marrow edema. At the insertion of the ligament at the medial talus, there is curvilinear hyperintensity suggestive of a non-displaced avulsion fracture. Coronal imaging identified tears of both superficial and deep talotibial components, the latter which are typically more resistant to injury. Concomitant syndesmotic injury is common with medial

ligamentous complex injuries. The tibiofibular syndesmosis consists of the anteroinferior and posteroinferior tibiofibular ligaments as well as the interosseous tibiofibular ligament. Syndesmotic injuries constitute the so-called “high ankle sprain”, resulting from external rotation of the dorsiflexed foot. The anteroinferior tibiofibular ligament often exhibits a fluid-filled gap or discontinuity suggesting a complete tear, whereas the stronger posteroinferior tibiofibular ligament is rarely completely torn. Widening of the syndesmosis may be seen as a result of injury.

In the foot, the Lisfranc ligament connects the base of the medial cuneiform to the medial base of the second metatarsal, substituting for the absent intermetatarsal ligament between the first and second metatarsal. Sprains of the Lisfranc ligament, the so-called midfoot sprain, constitute the second most common foot injury in athletes (after metatarsophalangeal injuries). Signs of Lisfranc sprains on MR include fluid SI surrounding or extending within the ligament or first metatarsal, as well as a visibly enlarged, irregular ligament.